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PARTS 4 AND 6 OF RID/ADR/ADN

Chapters 4.2 and 6.7 UN Portable tanks

Transmitted by the International Union of Railways (UIC/IUR) */

Introduction

Four years ago, the representative of UIC, as a member of the UN working group on portable tanks, identified problems in the application of the new chapters 4.2 and 6.7. At that time there was, in the working group, a strict separation between technical matters and the questions related to assigning substances or groups of substances to tank types. Eventually, a 'lunch time working group' developed guidelines for assigning portable tank requirements to substances in classes 3 to 9.

The discrepancies between those Guidelines and the design criteria of the portable tanks, however, could not be solved up to now.

The representative of UIC submitted, through the years, many proposals to the UN Sub-Committee of Experts on the Transport of Dangerous Goods to solve the problems. Although there was sympathy from some experts for the proposed solutions, for various reasons no proposal was adopted.

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Because chapters 4.2 and 6.7 are now part of RID and ADR and the first portable tanks, designed according to these provisions, are constructed, the representative of UIC hopes that the problems may be solved on a European level, with a possible feedback later to the UN Sub-Committee.

Therefore, the representative of UIC proposes to discuss the problems firstly in the **RID/ADR working group on tanks**.

Use of the appropriate type of portable tank

According to Chapter 1.4, it is the obligation of the consignor and of the filler to use the appropriate type of portable tank for a certain dangerous substance (see 1.4.2.1.1 (c) and 1.4.3.3 (c)). The role of the carrier is not so explicit.

The applicable tank instruction and special provisions can be found in columns (10) and (11) of Table A. In addition, other tank instructions specified in 4.2.5.2.5 may be used.

First problem: how does the consignor or filler know whether he is going to fill a portable tank meeting the provisions of the tank instruction specified in Table A or in 4.2.5.2.5? The number of the tank instruction is not part of the marking and test certificates are mostly not available to consignors or fillers. The probability that a filler in e.g. Hungary will contact a portable tank operator in South Africa seems to be low. The consignor or filler may try to deduct from the marking and the nature of the equipment some information to discover the TI applicable to the portable tank, but this is not an easy exercise.

Second problem: how does the consignor or filler know whether the test pressure indicated on the tank plate is high enough? When he knows the tank instruction for the portable tank to be filled, he may compare the value of the test pressure on the tank plate with the values in the second column of table 4.2.5.2.6.

The values in this table are, however, minimum values. According to the definition of test pressure in 6.7.2.1, the user should not only consider the minimum values specified in 4.2.5.2.6, but also-"the value equal to 1,5 times the design pressure." This value may be substantially higher than the value according to 4.2.5.2.6. The design pressure is not indicated on the tank plate.

Third problem: how can the consignor or the user find the design pressure of the tank? The design pressure has been used to calculate the tank according to a recognized pressure vessel code. The design pressure for the tank is, however, closely related to the substance carried and depends on the vapour pressure of the substance, the partial pressure of air and the density (in relation to the head pressure).

It may be possible that, in designing a dedicated tank for the transport of one and the same substance, this design pressure can be calculated. Most portable tanks, however, are used for the transport of an unlimited number of different products, and it seems to be impossible to establish a uniform design pressure according to the definition for such a portable tank.How

should the consignor or filler then ever know if the tank he is going to use has the right design pressure and test pressure?

In the case of a similar problem: the calculation of the capacity of the pressure-relief devices, chapter 6.7 provides an alternative. Whereas 6.7.2.12.2.1 contains the formula to calculate the minimum rate of discharge of the relief devices for a tank, dedicated to the transport of a single substance, 6.7.2.12.2.2 and 6.7.2.12.2.3 present an alternative calculation method of the required rate of discharge on the basis of the external surface (exposed area) of the shell.

Such an alternative does not exist in the definition of the design pressure (and the related test pressure) in 6.7.2.1: the design pressure is the highest of the pressures indicated under (a), (b) or (c), and the test pressure is 1.5 times the design pressure. A proposal from the UIC to use the pressures indicated under (b) and (c) **alternatively** was not adopted by the UN Sub-Committee in July 2002. This means that the test pressures, associated with the tank instructions in the table 4.2.5.2.6, are only to be considered as minimum values, and the calculations according to (b) in the definition of the design pressure have to be made in all cases of filling of a portable tank with a new substance, in order to check if the test pressure according to that calculation is lower than the value, indicated on the tank plate.

Fourth problem: one of the elements of the value of the design pressure according to the definition in 6.7.2.1 is the 'head pressure', determined on the basis of the dynamic forces specified in 6.7.2.2.12, but not less than 0.35 bar. The opinions of experts on the value of this head pressure and how to calculate this, vary considerably: some experts say that 0.35 bar is enough for all portable tanks, other experts say the head pressure varies with the capacity of the tank, and may be as high as 1.2 bar for a 20 ft portable tank.

Furthermore, in the definition, reference is made to the **dynamic** forces specified in 6.7.2.2.12. In 6.7.2.2.12 it is, however, stated, that the portable tank shall be capable of absorbing the following **static** forces:

twice the MPGM multiplied by the acceleration due to gravity.

Moreover, in 6.7.2.19.1 it is stated, that the portable tank shall be shown to be capable of absorbing the forces resulting from an impact not less than 4 times (4g) the MPGM of the fully loaded portable tank.

How should the user of a portable tank, in order to check if the test pressure of the tank he wants to fill, is high enough, calculate this head pressure?

The UIC/IUR is of the opinion, that these procedures are much too complicated, not user-friendly and not enforceable. Moreover, such procedures do not exist for RID/ADR-tanks. In 4.3.4.1.1 only seven calculation pressures are specified, covering all types of tanks for liquids and solids. Why is such a simple system not possible for UN portable tanks?

Proposal:

Because of the fact that, according to 6.7.2.19.1, railway test institutes are involved in the

approval of portable tanks and because after so many years it seems to be impossible to solve the problems outlined in the UN Sub-Committee, the UIC/IUR proposes to discuss these questions in the RID/ADR working group on tanks, in order to find solutions at least on a European level.

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